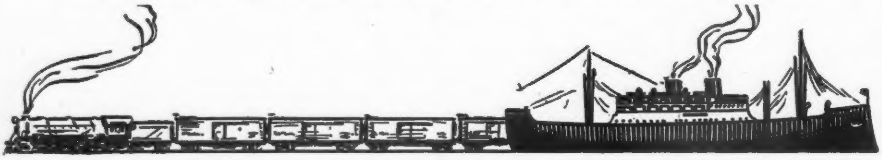
# The American FERTILIZER

**Published every other Saturday. Annual subscription: in the United States, $3.00; Canada and Mexico, $4.00; other countries, $5.00. Entered as second-class matter, January 15, 1910, at the Post Office at Philadelphia, Pa., under Act of March 3, 1879. Registered in United States Patent Office. Publication office, 1330 Vine St., Phila., Pa.**





*See page 25*

...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 102 JANUARY 13, 1945 No. 1

# Know Your Soil*

By JACKSON B. HESTER†

NEVER before in the history of man has there been available so much knowledge about soils. There is on record a tremendous amount of information about the genesis of the soils, the classification, the physical attributes, the chemical composition, the agronomic aspects and the economic value. Practically all of the agricultural soils of the United States have been carefully surveyed and mapped according to their physical attributes and economical value. Further, farming is one of the oldest and most honorable professions. Therefore, practical knowledge of growing crops accumulated through the ages is bountiful, yet it is no trivial task to make a success of farming. To be a successful grower one must know his soil. The object of this article is to point out some of the important fundamental things to be studied about a soil.

Perhaps one of the most fundamental things learned by soil research is that all soils differ. Strange as it may seem, they differ in practically every respect. No two soils have the same physical composition. Further, the chemical composition of all soils differs and so on down the list of sciences involved in soil research. The variations in color of soils on a single farm are familiar to every grower. The soils of New Jersey have all been classified and there are 193 different soil types in the State and 51 different soil series. The illustration in Fig. 1 shows the different soil zones in the State as outlined by Professor Linwood L. Lee (*Eul. 569, N. J. Exp. Sta.*). Upon talking with a successful grower about his soils he will tell you of many differences in his fields. He will tell you he can plow one field two days after a rain, but he has to wait three days for another field. He will, further, tell you that one field is best suited for the culture of strawberries, another field for potatoes and a third field is best for tomatoes. Yet there is no perfect soil. Fortunately, man has studied the defects and has learned how to correct or get along with these defects. There has been accumulated a great deal of information on the production of tomatoes. Since crops differ so much in their requirements of a soil, it is fitting to take this one crop and try to outline some of the knowledge one should have in growing it successfully. Practically every farm in the eastern part of the United States is composed of several different soil types.

### Know the Texture of Your Soil

All soils are composed of sand, silt and clay. The amount of one or the other of these constituents determines the texture of a soil. A soil with a high sand content has an open texture and may be well-drained, whereas one with a large amount of clay has a close texture and may be poorly-drained. However, the latter statement is true only within a limited range for the composition of the clay has a great deal to do with the way it clings together or becomes packed. Some clays cling together in crumb-like structure and are well-drained. However, these two types of soils are entirely different in nature and must be farmed in an entirely different manner to produce successful crops. In the production of tomatoes in the humid region, soils that are well-drained must be selected. In other words, tomatoes should not be placed on soils that have low wet spots in them. See Fig. 2. Each grower must study

*A paper delivered before the tomato growers of New Jersey and Pennsylvania, January, 1945.

†Department of Agricultural Research, Campbell Soup Co., Riverton, N. J.

his soils and avoid those fields that are likely to become "water-logged" during the growing season. True, low wet fields may produce a good crop during extremely dry years, but one must take the soil selection that is most likely to produce a good crop during the average year and a fair crop even in the worst years. The nature of the drainage of the soil can be obtained by an examination of the subsurface soil (B horizon). If the soil below the surface or plowed horizon shows a mottled condition instead of a uniform color, the soil is not likely to produce a superior crop of tomatoes because of the lack of adequate drainage. See Fig. 3.

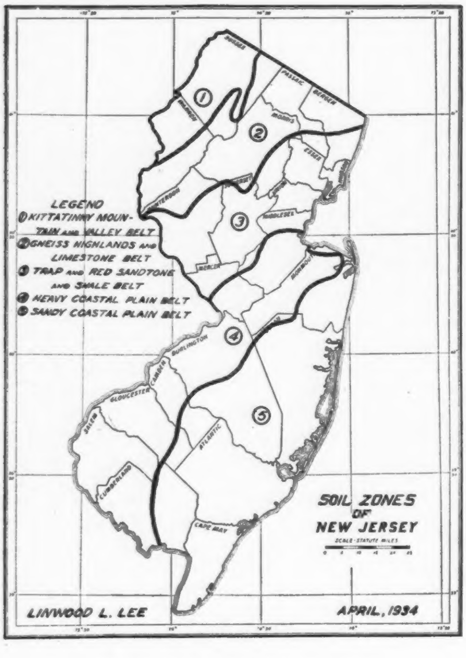



Fig. 1. Soil zones of New Jersey

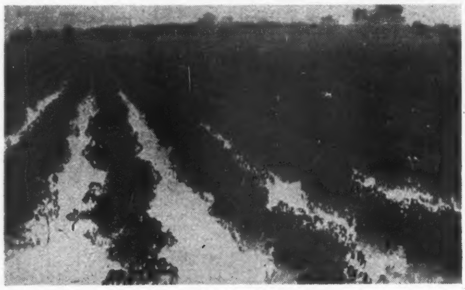
On the other hand, soils that are extremely sandy in nature are difficult to handle. The plant food supply and water-holding capacity are more than likely to be insufficient for economical yields. See Fig. 4. Therefore, select a uniform soil that has good internal and surface drainage whenever possible, but above everything study the soil type and farm it accordingly. Once the soils have been classified in respect to drainage and soil type and a system of management developed, select a system of crop rotation for the soil types and farming practices.

### A Crop Rotation to Fit the Soil Type

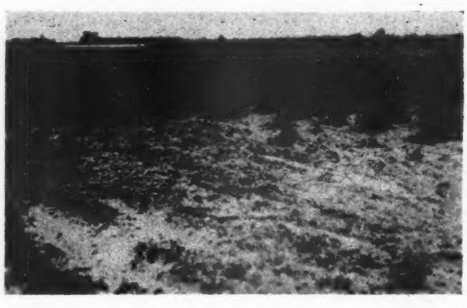
Commercial fertilizers and lime are only supplementary to soil fertility. In other words, plant food from fertilizers only supplements that already found in the soil and cannot be expected to be the sole support of crop production. One of the most successful ways to maintain soil fertility is by proper crop rotation. By this is meant a system whereby soil depleting crops are not the only ones grown in the rotation.

Tomatoes do exceptionally well after sod crops, corn with the stover returned, wheat,

Proper surface and internal soil drainage



Improper surface drainage



Improper internal soil drainage

Fig. 2. Soil drainage

rye and oats with straw returned or after almost anything whereby a large amount of organic matter is plowed under. See Fig. 5. Corn, wheat, rye, oats, etc., give a cash return as well as add organic matter to the soil. The best of all is to have tomatoes follow leguminous crops like Ladino clover, soybeans, alfalfa, and the various other soil improving crops where at least a goodly supply of organic matter is returned to the soil. These crops furnish fresh organic constituents for the soil microbiological life to live upon and make available to the cash crop much of the plant food (calcium, magnesium, nitrogen, phosphorus, and potash) required by it, to say nothing of the minor plant food elements, (iron, manganese, zinc, boron, etc). See Bulletin 3 published by Campbell Soup Co. Research Department, Riverton, N. J. The organic matter added to sands decomposes more rapidly than that added to heavier soils. Therefore, when organic matter is added to sands a cash crop should be growing to get the benefit of it. Select cover crops that make the best growth on the soil under consideration. Fit the rotation to the soil type. The physical aspects of the soil are improved by the decomposition and building up of the soil organic matter.

The water-holding capacity and plant food supplying power of sandy soils and the drainage, aeration and plant food supplying power of heavy soils are improved by proper crop rotation. In short, a continuous economical crop production is dependent upon a proper


Soil has good internal drainage


Soil has mottled B horizon—poor drainage

Fig. 3. Determining internal drainage


Fig. 4. Soil too sandy and too poor for tomatoes

This same complex becomes acid in nature crop rotation. Soils should not be allowed to remain bare over the winter if this can be avoided because erosion by wind and water and the leaching of plant food is too expensive. Organic matter should never be burned off of the land because the organic matter is destroyed and nitrogen goes off into the air.

**Know the Lime Requirement of Your Soil**

While the proper degree of acidity or alkalinity in the soil for the ideal growth of most crops has been very well established, to obtain this condition is an individual problem for each soil. The soil clay and organic matter have the power to hold available the plant food necessary for the growing crop. and depleted for bases (calcium, magnesium, potassium and sodium). For the optimum growth of tomatoes, most vegetable crops and many farm crops, this complex should be about 60 per cent saturated with calcium and about 20 per cent saturated with magnesium. In other words, when the soil is limed the acid nature of the clay and organic matter is saturated with the calcium and magnesium supplied by the liming material. This phase of soil improvement is very important.

However, soils differ tremendously in the amount of lime necessary to give the desired results. The pH value of the soil only gives the extent of the depletion, but a test for calcium, magnesium, the organic matter con-

tent, and a knowledge of the soil type gives information for determining the lime required. Each successful grower must have this information either through scientific analyses or through practical study. It is far easier and less expensive through laboratory studies than through practical experiments. See Bulletins 1 and 2 of Campbell Soup Co. Research Department. Sandy soils change more rapidly than heavy soils and must be subjected to chemical analyses more often.

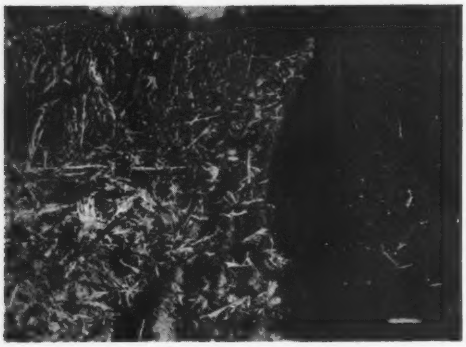
Satisfying the lime requirement of the soil is only another step in getting ready for maximum crop production and supplying the other major plant food elements is another necessary step.

**Know the Requirements of Your Soil for Nitrogen, Phosphorus and Potash**

The amount of nitrogen held in the soil is almost entirely associated with the organic matter content. The rate at which it becomes available is almost entirely dependent upon the texture of the soil, the composition of the organic matter and the prevailing climatic conditions. The soil organic matter analyses about 5 per cent nitrogen, therefore, if a sandy loam soil has 15 tons of humus to the acre (1.5 per cent) it will have approximately 1,500 pounds of nitrogen to the acre. Of this, probably less than 5 per cent will be nitrified in a year. Since some of the nitrogen is lost to the air and some leached, it is obvious that the supplemental must be supplied from cover crops, manure and commercial fertilizer. A crop of 10 tons of tomatoes will utilize more than 100 pounds of nitrogen and it requires a ton of 5–10–10 fertilizer to supply a hundred pounds of nitrogen. However, if the mere addition of 100 pounds of nitrogen to the soil was all that was necessary to supply the nitrogen, it would be pretty simple, but this nitrogen must become available as the plant needs it or it may be lost through leaching. The status of the absorption of nitrogen by 3,000 tomato plants is approximately 3 or 4 pounds the first month, 25 or 30 pounds the second month and 50 or 60 pounds the third month. However, the plant is not in physical contact with all of the soil so there must be actually more than the above specified amounts available in the soil at any given time. Heavy silty loam soils may have 3 per cent organic matter and, due to the clay content, would have to have that amount to be equal in immediate fertility to a sandy loam with 1.5 per cent organic matter. A silty loam with 3 per cent organic matter would have 30 tons of humus or 3,000 pounds of nitrogen. However, due to the compact nature of the soil the organic matter would oxidize more slowly and would only give

(Continued on page 26)

Soybeans



Corn stover

Weed growth, resting the soil

Fig. 5. Excellent soil improving crops

# Greenhouse Pot-Culture Tests on Rock Phosphates as Sources of Phosphorous for Plants

By B. E. Brown and K. D. Jacob[1]

THIS paper deals with greenhouse pot-culture tests to compare (1) a number of phosphate rock samples collected in different parts of the world and (2) several domestic phosphate rocks, as sources of phosphorus for crop plants. The main object of the tests was to determine whether these raw phosphates might differ in efficiency as sources of phosphorus for the indicator plants selected and what degree of variability might be found to exist among certain domestic phosphate rocks. In all comparisons ordinary superphosphate was employed as the standard source of phosphorus.

[1]Respectively, senior biochemist, Division of Fruit and Vegetable Crops and Diseases, and senior chemist, Division of Soil and Fertilizer Investigations, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

### Composition of Phosphates Compared

The chemical composition of the phosphate rock samples compared is given in Table I. In this connection, a rather wide variation in total $P_2O_5$ will be noted, ranging from 23.05 per cent for Florida waste-pond phosphate (colloidal phosphate) to 40.55 per cent for the Curacao Island phosphate rock. The phosphates from Christmas Island and Nauru Island also were quite high in total $P_2O_5$. Curacao Island phosphate ran highest in both citrate-soluble and citric acid-soluble $P_2O_5$. The fluorine content of the phosphate rocks ranged from 0.5 per cent in the Curacao Island material to 4.12 per cent in the Moroccan phosphate.

### Greenhouse Pot-Culture Tests

The different greenhouse tests were made in 1-gallon glazed pots holding 5.5 kilograms of

TABLE I

CHEMICAL COMPOSITION OF PHOSPHATE ROCK SAMPLES[1] USED IN GREENHOUSE POT TESTS

| Laboratory Number | Phosphate Material and Location of Deposit | $P_2O_5$ Content: Total Per cent | Citrate Soluble[2] Per cent | Citric Acid Soluble[3] Per cent | Fluorine Content Per cent |
|---|---|---|---|---|---|
| 1,315 | Superphosphate, made from Florida pebble, 20-mesh | 19.20 | 19.08[4] | .... | 1.56 |
| 947 | Florida pebble, Brewster | 31.04 | 2.46 | 6.54 | 3.86 |
| 790 | Florida pebble[5] | 31.24 | 3.08 | 6.74 | 3.84 |
| 912 | Florida pebble, Mulberry | 35.15 | 3.27 | 6.63 | 3.69 |
| 932 | Florida hard-rock, Dunnellon | 35.81 | 2.87 | 7.19 | 3.87 |
| 915 | Florida waste-pond phosphate (colloidal phosphate), Dunnellon | 23.05 | 2.10 | 7.32 | 1.79 |
| 1,253 | Idaho phosphate, Conda | 32.04 | 2.30 | 6.26 | 3.24 |
| 1,252 | Montana phosphate, Garrison | 36.31 | 1.68 | 5.33 | 3.77 |
| 1,139 | South Carolina land-rock, Johns Island | 26.71 | 4.60 | 7.77 | 3.54 |
| 906 | Tennessee brown-rock, Wales | 34.26 | 1.59 | 5.66 | 3.75 |
| 908 | Tennessee brown-rock, Mt. Pleasant | 34.29 | 2.09 | 6.22 | 3.79 |
| 930 | Tennessee blue-rock, Gordonsburg | 30.83 | 1.59 | 6.87 | 3.49 |
| 948 | Wyoming phosphate, Cokeville | 30.08 | 1.72 | 4.14 | 3.47 |
| 1,231 | Christmas Island phosphate | 39.80 | 5.25 | 12.99 | 1.26 |
| 943 | Curacao Island phosphate | 40.55 | 5.61 | 14.55 | .50 |
| 453 | Morocco phosphate | 33.28 | 4.27 | 10.36 | 4.12 |
| 450 | Nauru Island phosphate | 38.58 | 3.72 | 10.04 | 2.68 |

[1]All phosphate rock samples were ground to pass a 100-mesh sieve.

[2]In the determination of citrate-soluble $P_2O_5$, the citrate extracts were filtered through Pasteur-Chamberland tubes in order to hold back all colloidal material; in other respects, the method was the official procedure, using 1 gram of sample and 100 cc. of neutral ammonium citrate solution.

[3]Citric acid-soluble $P_2O_5$ was determined by the official method prescribed for basic slag, namely, digestion of 5-gram samples with 500 cc. of 2 per cent citric acid.

[4]Including 16.7 per cent of water-soluble $P_2O_5$.

[5]Location of deposit unknown.

soil. The soil type used was mainly Norfolk loamy fine sand, but in a single test with German millet as the indicator crop other soil types were employed, including Caribou loam, Chester loam, and Sassafras fine sandy loam. In all tests a 5–12–6 fertilizer mixture was applied at the rate of 1 gram per kilo of soil, equivalent to 2,000 pounds per acre. Nitrogen[2] was derived equally from three sources: sodium nitrate, ammonium sulphate, and cottonseed meal; potash[3] was from high-grade muriate of potash; and phosphoric acid from the phosphates under comparison. All phosphorus applications provided the same quantity of total $P_2O_5$.[4] This meant that the raw phosphates provided much less available (citrate-soluble) $P_2O_5$. (See Table II.) A no-phosphorus mixture, 5–0–6, served as a control treatment to indicate the degree of response to the phosphorus treatment in the soils used. Calcined kieserite was added to each pot at the rate of 15 milligrams of MgO per kilogram of soil, equivalent to 30 pounds per acre, to provide sufficient available magnesium. The required fertilizer materials were incorporated with each batch of soil by means of a mechanical mixer.

Two pot tests were made with Japanese millet on the Norfolk fine sandy loam. This soil had been found by previous experience to be very deficient in available phosphorus. The soil used in these tests had a pH value of 5.5. Average results are given in Table II.

An examination of the results presented in Table II shows a marked response on the part of Japanese millet to the superphosphate mixture—practically two and one-half times the growth from the no-phosphorus mixture. This trend is definitely in line with previous phosphate pot-culture studies made on this soil type, although some crop-plant indicators have failed to respond to phosphate additions to the marked extent shown by Japanese millet.

Some of the finely-ground raw phosphates did fairly well as sources of phosphorus, South Carolina land-rock phosphate particularly so. Next to it came the phosphate sample from Curacao Island, followed in order by the Christmas Island phosphate, Morocco phosphate, and then a trailing list downward. No definite correlation was brought out in these tests to indicate that fluorine affected the

(Continued on page 28)

[2]Nitrogen (N) applied at rate of 100 pounds per acre.

[3]Potash ($K_2O$) applied at rate of 120 pounds per acre.

[4]Phosphoric acid applied at rate of 240 pounds of total $P_2O_5$ per acre.

TABLE II

RESULTS WITH JAPANESE MILLET COMPARING 16 ROCK PHOSPHATE SAMPLES WITH ORDINARY SUPERPHOSPHATE AS PHOSPHORUS SOURCES IN COMPLETE FERTILIZER

Soil type: Norfolk loamy fine sand, pH 5.5

| Source of $P_2O_5$ in 5–12–6 Mixture[1] | Available $P_2O_5$ Applied per Pot Milligrams | Dry Weight of 30 Plants (Average of Two Tests[2]) Actual Grams | Relative[3] | Rating According to Yield Status |
|---|---|---|---|---|
| N-K (5–0–6) | .. | 10.2 | 100 | 18 |
| Superphosphate | 656 | 25.5 | 250 | 1 |
| South Carolina land-rock | 114 | 20.0 | 196 | 2 |
| Curacao Island phosphate | 91 | 15.4 | 151 | 3 |
| Christmas Island phosphate | 87 | 14.5 | 142 | 4 |
| Morocco phosphate | 85 | 14.3 | 140 | 5 |
| Florida pebble[4] | 65 | 11.3 | 111 | 10 |
| Nauru Island phosphate | 64 | 11.6 | 114 | 6 |
| Florida pebble (Mulberry) | 61 | 10.8 | 106 | 15 |
| Waste-pond phosphate (Florida) | 60 | 11.5 | 113 | 7 |
| Florida hard-rock | 53 | 11.5 | 113 | 8 |
| Florida pebble (Brewster) | 52 | 11.4 | 112 | 9 |
| Idaho phosphate | 47 | 11.0 | 108 | 12 |
| Tennessee brown rock (Mt. Pleasant) | 40 | 11.2 | 110 | 11 |
| Wyoming phosphate | 38 | 10.9 | 107 | 14 |
| Tennessee blue-rock | 34 | 10.6 | 104 | 17 |
| Tennessee brown-rock (Wales) | 31 | 10.7 | 105 | 16 |
| Montana phosphate | 31 | 11.0 | 108 | 13 |

[1]Arranged in descending order according to available (citrate-soluble) $P_2O_5$ applied per pot.

[2]Each test consisted of three pots per treatment, 10 plants per pot.

[3]The N-K (5–0–6) treatment put at 100. Each pot received the same quantity of total $P_2O_5$, namely, 660 milligrams.

[4]Location of deposit unknown.

# IT MAY BE

By SAMUEL L. VEITCH

### Taxes

It won't be long between now and March 15th. There are several angles to be watched by individuals this year. Firstly, the balance of the unforgiven tax for 1943 must be paid which means the final half of the unforgiven 25 per cent. The Government requires this be paid separately and not be combined with any other payment. Secondly, your final return for 1944 must be filed by March 15th (providing you didn't file on January 15th), and any balance due must be paid then. Thirdly, estimated tax return for 1945 must be filed and the first quarter payment made with the filing.

### Jones-Wallace Feud

The Jones-Wallace feud is the hottest struggle to strike Washington since the Dolly Gann-Alice Roosevelt Longworth "catch as catch can" who's going to sit where at whose dinners. Senate Commerce Committee has been listening with undivided attention. The hearings were on the George Bill to separate the Federal Loan Agency from the Commerce Department, where Congress put it when Jones became Secretary. There are strong indications the George Bill will be passed e-v-e-n-t-u-a-l-l-y.

### Ration Tokens

Would you believe one of the main reasons for calling in ration tokens is to keep them out of coin machines. So, up until now you didn't know they would work, did you?

### Industry Advisory Committees and Trade Agreements

Fear of violating anti-trust laws has been given as the reason for industry advisory committees not taking a more active part in formulating trade agreements promoted by the Government. But Wendell Berge, in charge of anti-trust legislation enforcement, is quoted as saying that there is no objection to advisory committees meeting and reaching agreements as to their recommendations with the understanding that a minority opinion of the committees be heard.

### Operating Cost of Farms

Operating cost of farms, according to the "Agricultural Situation," were as follows: Feed 21.2 per cent, livestock purchased 6.8 per cent, operation of motor vehicles 6.8 per cent, building repairs 6.5 per cent (looks high), fertilizer and lime 4 per cent, maintenance of motor vehicles 3.5 per cent, machinery and equipment 3.5 per cent, hired labor 18.1 per cent, taxes 4.2 per cent, interest of farm mortgages 2.5 per cent, and rent 11.7 per cent.

### Odds and Ends

Farm cost incomes from marketing of farm products was 6 per cent greater in the first nine months of 1944 than for a similar period of 1943. Income from crops rose 8 per cent and income from livestock increased 5 per cent.

Cotton stocks at the end of November are estimated at 18,886,000 bales. This is 1,100,000 bales larger than a year ago. About 36 per cent of the total stock is in the hands of the Government.

Nearly half the farmers of this country rent the land they use, according to the United States Department of Agriculture.

Farmers will have more tractors in 1945 than in any previous year. The number of horses and mules in the United States is less than half the number in this country at the end of World War I.

The Agricultural Research Administration announces that a weed control compound called 2-4D for short, has given surprisingly good results in killing weeds in grass plots without damaging the grass and may also prove useful against some weeds in grain fields.

According to the Bureau of Agricultural Economics the harvested acreage of cotton in 1944 was the smallest since 1895.

**THE AMERICAN FERTILIZER**
ESTABLISHED 1894
PUBLISHED EVERY OTHER SATURDAY BY
WARE BROS. COMPANY
1330 VINE STREET, PHILADELPHIA, PA.

A Magazine international in scope and circulation devoted exclusively to the Commercial Fertilizer Industry and its Allied Industries

PIONEER JOURNAL OF THE FERTILIZER INDUSTRY

A. A. WARE, Editor
C. A. WHITTLE, Associate Editor
K. F. WARE, Advertising Manager
E. A. HUNTER, Southern Advertising Manager
2246 E. Lake Road, N. E.,
Atlanta, Ga.

ANNUAL SUBSCRIPTION RATES

| | |
|---|---|
| U. S. and its possessions, also Cuba and Panama | $3.00 |
| Canada and Mexico | 4.00 |
| Other Foreign Countries | 5.00 |
| Single Copy | .25 |
| Back Numbers | .50 |



Vol. 102 JANUARY 13, 1945 No. 1

## *Principal Articles in This Issue*



# International Minerals & Chemical Corp. Plans Diversified Production

"The principal objective of International Minerals and Chemical Corporation for 1945 and the years immediately following the war is to develop new products from the raw materials available to the corporation from its present sources of supply and thus further diversify its activities," according to a statement by Louis Ware, President of the corporation.

Pointing out that International Minerals and Chemical Corporation has no reconversion problem, Mr. Ware said:

"Even with the possibility of an early lessening or termination of part of the nation's enormous war demands, requirements for phosphate, potash, fertilizer and chemicals produced by this corporation are expected to continue at a high rate.

"During 1944 our mines, fertilizer factories and chemical plants contributed measurably to the great war production needed by our country," he continued. "All of our operations and plants have been producing at capacity, and the volume of goods produced and of sales has been greater than in any previous year in the corporation's history. At the same time, production facilities have been improved, labor-saving equipment has been added, and new products have been developed to utilize raw materials we have available and afford increased diversification both now and after the war.

"The Amino Products Division is one of the most interesting, from a growth viewpoint, which the corporation operates. It produces mono sodium glutamate and glutamic acid products, the former being very much in demand for use in the soup and food industries. The corporation has patents and facilities for making this material from beet sugar liquor. However, during the present war years, with the beet sugar operations greatly curtailed, the business has suffered from lack of raw material. Changes have been made in the plant to successfully use a substitute material, wheat gluten, and production is now again getting back to a normal output. With the resumption of beet sugar operations in the post-war years, the future growth of this business is attractive and the corporation has planned to expand its facilities.

"Domestic shipments of phosphate, potash and fertilizer from our plants have established new high records and have helped American

farmers grow the largest crops in the nation's history.

"Any temporary slackening of domestic demand for phosphate after the fall of Germany is expected to be offset by the prompt resumption of exports after cessation of hostilities in Europe. Inquiries for foreign shipment are already being received.

"Some contraction from the abnormally high wartime consumption of potash can be expected when peace comes, and the potash market will also be influenced by the extent to which foreign potash is imported after the European war is over. Until 1939 the United States imported approximately 50 per cent of its potash requirements from Germany. Potash production of the corporation's mine in the Carlsbad, New Mexico, area has helped make the country entirely self-sufficient during the war. It is significant that International Minerals & Chemical Corporation uses a substantial tonnage of the potash it produces in the manufacture of its various products."

## How Virginia with Less Labor Grew More

Virginia's farm production in 1944 was six per cent above 1943—despite the decrease in farm labor supply.

How did the farmers do the job? They worked longer hours. They made better use of each member of the family as a farm worker. Methods of production, seeds, fertilizers and the like were improved and better use was obtained of labor-saving machinery such as tractors, hay loaders and the like. Better management, better-planned use of labor, and use of inexperienced hands also helped.

—*Va. Extension News Item.*

## Federal Crop Insurance

Federal crop insurance is to be revived. A House measure providing that loss claims should not exceed the insured farmer's actual investment in the damaged crop was amended by the Senate to pay claims up to 75 per cent of the crop value, based on average yields.

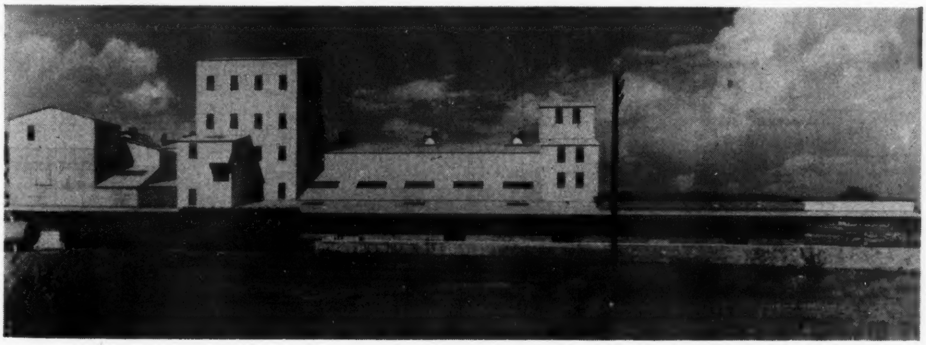
If finally enacted, the measure will provide insurance in 1945 on wheat, cotton and flax. The plan is to include not more than three other crops annually in the future, on an experimental basis.

The bill also provides a $30,000,000 program of incentive payments for the production of flax to increase the output of linseed oil now greatly needed.

## New Central Chemical Plant in Production

The new superphosphate and mixed goods plant of the Central Chemical Corporation at Hagerstown, Md., which was opened last fall with impressive ceremony, is now in full operation. A masterpiece of steel and concrete, this five-story plant reveals many innovations in building design and in production and handling equipment. The plant was designed and equipped by the A. J. Sackett & Sons Company, architects and manufacturing engineers, of Baltimore.

Of special interest is the newly patented process employed at this plant for the manufacture of superphosphate. A development of the A. J. Sacket Company, this unique manufacturing method is being hailed as an important advancement in superphosphate production.



**The new superphosphate and mixing plant of the Central Chemical Corporation at Hagerstown, Md.**

## New Sulphuric Acid Facilities Announced

A revised list of new and expanded facilities for the production of 550,200 additional tons of sulphuric acid annually, which have been approved by the War Production Board, was presented to the Inorganic Acids Industry Advisory Committee at a recent meeting.

The list of facilities follows:

| Company and Location | New Capacity (Annually) (Virgin Acid) |
|---|---|
| General Chemical Co. Calumet, Ill. | 40,000 tons |
| E. I. du Pont de Nemours Co. East Chicago, Ind. | 36,000 tons |
| Stauffer Chemical Co. Hammond, Ind. | 43,200 tons |
| General Chemical Co. St. Louis, Mo. | 35,000 tons |
| Monsanto Chemical Co. St. Louis, Mo. | 72,000 tons |
| National Lead Co. St. Louis, Mo. | 72,000 tons |
| General Chemical Co. Cleveland, Ohio | 50,000 tons |
| General Chemical Co. Newell, Pa. | 50,000 tons |
| E. I. du Pont de Nemours Co. Penn's Grove, N. J. | 80,000 tons |
| Volunteer Ordnance Works Chattanooga, Tenn. | 72,000 tons |
| Total | 550,200 tons |

The committee recommended that no acid facilities be considered in addition to the above mentioned group unless the Ordnance Department can prove the necessity of such facilities, WPB said.

Approximately 1,200 additional tank cars for them ovement of sulphuric acid, comprised of 600 new cars and 600 converted cars, will be available to the industry and to Army Ordnance in the near future, the committee was told by WPB officials. It is estimated that this quantity will be adequate to meet all expected requirements, WPB said.

## Replenishing Feed Reserves

The change from now on, although it may be gradual, from global war to peacetime conditions, will bring many problems and difficulties necessitating further adjustments and changes in systems of farming on thousands of Louisiana farms. Sounding a warning of possible conditions which may hinder a repetition of the high crop yields of the war years, War Food Administrator Marvin Jones reminds farmers that "during these years we have drawn heavily upon huge reserves of feed grains and these must now be replenished."

"To allow a margin of safety in case of bad weather," he says, "and to assure maintenance of reserve we need to plant about the same total acreage as in 1944. We cannot risk the possibility of a shortage."

In other words, it is equally important to grow food, feed, and fiber in this culminating year of the war as it was at the beginning. There can be no question but farmers will meet the test just as they have hitherto.

—*Louisiana Extension Service.*

## Fertility for Higher Food Values

"Good fertile soils are essential to a better standard of living because it takes a good soil to produce maximum yields. Also soils must be fertile if the food and feed produced upon them are to be nutritious. As Walter Locke, noted writer, puts it: 'We have known that poor soils make poor crops. We have noted that stunted soils make stunted men. We thought that grass was grass. But grass can have only what the soil beneath it gives. Little potash, lime or phosphorus in the soil means little potash, lime or phosphorus in the grass. That means too little in the child that drinks the milk.' "—*P. S. Williamson in South Carolina Extension Service Press Release.*

# FERTILIZER MATERIALS MARKET

## NEW YORK

**Demand for Sulphate of Ammonia and Nitrate of Soda Continues at Top Levels with Supplies Limited. Shortage of Superphosphate Continues with Production Lagging. Potash Production Makes New Records.**

*Exclusive Correspondence to "The American Fertilizer"*

NEW YORK, JANUARY 10, 1945.

**Sulphate of Ammonia**

Due to the shortage of nitrogen compounds, mixers have been trying to obtain larger supplies of sulphate of ammonia to maintain their production. The situation is very tight and indications are that the demand will increase during the coming weeks.

**Nitrate of Soda**

No excess supply is on the markets. Reports show that farmers have made large purchases of nitrate which they have stored for future top dressing.

**Superphosphate**

This material is causing much anxiety among fertilizer mixers. November production was about 8 per cent under that of November, 1943. Shortage of both sulphuric acid and manpower is reported in all sections. While additional tank cars have been made available for acid transportation, it looks as if the supply will fall considerably short of demand.

**Phosphate Rock**

The shortage of superphosphate cannot be blamed on a limited supply of phosphate rock. Miners have been supplying acidulators with all the rock they can use. It is reported that rock production for 1944 will be more than 5½ million long tons.

**Potash**

This material continues in a favorable supply position. Allocations have been filled promptly and, in spite of increased demand expected during the spring months, no shortage is anticipated. Preliminary figures show a total production for 1944 of about 820,000 tons $K_2O$.

## CHARLESTON

**Army Draft Demands May Handicap Fertilizer Plants and Farm Production. Shortage of Almost All Materials**

*Exclusive Correspondence to "The American Fertilizer"*

CHARLESTON, JANUARY 9, 1945.

Fertilizer manufacturers, bothered already by the scarcity of labor in their plants, now are somewhat puzzled as to the possible demand this spring, if the Government does draft farm labor for the armed services.

*Organics.*—These continue extremely scarce. Even though some fertilizer manufacturers continue to be willing to pay $5.53 per unit of ammonia ($6.72 per unit N), f. o. b. northern points, for blood, little can be obtained.

*Castor Meal.*—No improvement in this situation, and the productions are sold up for the next month or two.

*Nitrate of Soda.*—With the scarcity of other minerals, the supply situation on this remains very tight.

*Superphosphate.*—The market on this continues very tight, especially in the South. The production for November was between 30,000 to 40,000 tons less than November, 1943.

## CHICAGO

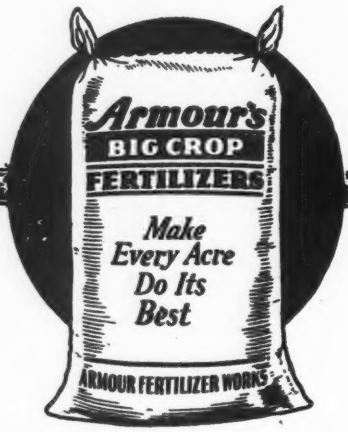
**Little Hope of Improvement in Supply of Fertilizer Organics. Demand in Feed Market Continues.**

*Exclusive Correspondence to "The American Fertilizer"*

CHICAGO, JANUARY 8, 1945.

Western organics are still far short of the demand, and the trade expects this to continue for some time. Scarcely any offerings are on the local market, and the labor situa-

# Fertilizer Materials




## Let us Quote on YOUR Requirements

PHOSPHATE ROCK
SUPERPHOSPHATE
DOUBLE SUPERPHOSPHATE
SULPHURIC ACID
BONE MEALS
DRIED BLOOD
TANKAGES
BONE BLACK
SHEEP MANURE
PIGMENT BLACK
SODIUM FLUOSILICATE

## ARMOUR FERTILIZER WORKS

**General Offices: Hurt Building, Atlanta, Ga.**
**Mailing Address: P. O. Box 1685, Atlanta 1, Ga.**

Division Sales Offices:

Albany, Ga.
Atlanta, Ga.
Augusta, Ga.
Baltimore, Md.
Birmingham, Ala.
Chicago Heights, Ill.
Cincinnati, Ohio
Columbia, S. C.
Columbus, Ga.
East St. Louis, Ill.
Greensboro, N. C.
Havana, Cuba
Houston, Texas
Jacksonville, Fla.
Nashville, Tenn.
New Orleans, La.
New York, N. Y.
Norfolk, Va.
Presque Isle, Me
San Juan, P. R.
Sandusky, Ohio
Montgomery, Ala
Wilmington, N. C.

tion is such that no hope is expressed for any improvement.

Call for dry rendered tankage and blood continues in the feed market, while wet rendered tankage is considered slightly less than ceiling prices.

Ceiling prices are:

High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.53 per unit ammonia ($6.72 per unit N); blood, $5.53 ($6.72 per unit N); dry rendered tankage, $1.25 per unit of protein, f. o. b. producing points.

## TENNESSEE PHOSPHATE

**Record Production of Phosphate Rock for All Consuming Lines. Small Stocks on Hand of Any Grade.**

*Exclusive Correspondence to "The American Fertilizer"*

COLUMBIA, TENN., JANUARY 8, 1945.

During the past two weeks the weather has been a customary combination of the good and bad, with rain predominating most of the time. As the cold wave was sweeping the North and East, moderate temperatures prevailed here with almost daily rain, detrimentally affecting both phosphate and farming operations. Nevertheless the phosphate industry closed up its largest year's production and shipment in the history of the Tennessee field. The sales at the various tobacco warehouses have made good records and have brought over a million dollars already to the farmers of Maury County, with many sales still to be held which will run the total to double the present figure.

Figures of ground rock production and sale to farmers for direct application to the soil during 1944 indicate an increase of 30 per cent over 1943, handled entirely through commercial channels. In 1943 the AAA handled approximately one-sixth of the Tennessee production, with about double that amount from Florida into Kentucky and Illinois. During 1944 no Tennessee rock was handled through AAA, but that organization handled about twice as much from Florida as in 1943. They have asked bids for 250,000 tons for 1945, none of which will likely come from Tennessee. It is quite doubtful if Florida will furnish the entire amount, even if AAA should order that much, as a great deal of Florida rock is now being supplied through the same commercial channels whose orders have absorbed the entire Tennessee production and could easily do the same with the entire Florida production in the present state of demand. It is still a matter of wonder why the AAA considers it necessary to attempt to sell a large amount of this product in Illinois and Kentucky, where the business has been built up by present commercial handlers who are unable to get enough to supply their orders at considerably above the wholesale prices being given by AAA.

Shipments into all consuming channels, including the makers of high phosphorus iron, have continued to hold the percentage of increase shown throughout 1944, while the use by the three local electric furnace operators has continued at capacity rate. The industry, as a whole, has gone into the new year with very small inventories of stocks on hand of all grades.

No announcement is as yet obtainable as to when the new defluorinating plant of TVA at Godwin will be in operation. As their chemical engineer from Wilson Dam expects to deliver a paper at the January 30th dinner meeting of the Middle Tennessee Technical Society, information will doubtless be forthcoming at that time on defluorinating phosphate rock, which may include details as to anticipated output.

## Defluorinated Superphosphate for Livestock

The Florida Experiment Station has concluded from its investigations that defluorinated superphosphate can be used satisfactorily with swine, beef and dairy cattle when offered in appropriate form, as a result of a series of tests reported in Bulletin 401.

In the introductory statement of the bulletin it is stated: "It has become common practice of the Southeast to provide animals with mineral supplements including one or more of the following: Common salt, steamed bone meal and a salt-iron-copper-cobalt supplement known commonly as 'salt-sick' mineral.

"Conditions in 1943 and early 1944 caused a scarcity of steamed bone meal which is important as a source of phosphorus and calcium for cattle, goats, sheep, and swine.

"When natural phosphates were fed animals for a sufficient length of time, certain characteristic symptoms occurred. Appetites were restricted somewhat, and gains in weight were lower than when steamed bone meal served as the source of supplementary phosphorus."

Excess fluorine in the natural phosphate was found to be the cause of the trouble. The bulletin, however, states that "fluorine may be essential in extremely limited amounts but has a cumulative injurious effect when fed in excess over long periods." A reduction of fluorine content to a level closely comparable to that of steamed bone meal was desired. This was placed at 0.2 per cent. Over 40 samples of Florida rock phosphate were found to contain 3.75 per cent fluorine as an average.

Superphosphate producers having facilities for defluorination gladly cooperated, the chemists of the producers having already worked out the processes. The standard of 0.2 per cent was met.

The Florida Station worked out the average consumption of mineral supplements per animal, finding that it was 2.70 pounds of common salt, 5.61 pounds of "salt-sick" mineral and 11.93 pounds of mineral supplement A in a twelve-month period.

The supplements were constituted as follows:

*"Salt-Sick" Mineral (No. 1)*

| | |
|---|---|
| Common salt | 100 pounds |
| Red oxide of iron | 25 pounds |
| Copper sulphate | 1 pound |
| Cobalt sulphate | 1 ounce |

*Supplement A*

| | |
|---|---|
| Bone meal | 45 pounds |
| "Salt-sick" mineral | 45 pounds |
| Cottonseed meal | 5 pounds |
| Blackstrap molasses | 5 pounds |

Supplement B was prepared by placing defluorinated superphosphate in the place of bone meal.

Supplement A, containing 45 parts of steamed bone meal, was slightly more palatable to beef cattle than Supplement B which contained 45 parts of defluorinated superphosphate.

The choice of dairy cattle for defluorinated superphosphate in the center of the State was for the higher content of salt, that is, 7 pounds of salt to 3 pounds of phosphate, while cattle in the salt marsh region preferred the mixture of 3 pounds of common salt and 7 pounds of defluorinated superphosphate.

Swine running on peanuts showed a slight partiality for the mixture containing steamed bone meal.

The "Summary and Conclusions" given in the bulletin are as follows:

"Defluorinated superphosphate being produced commercially contains 10.9 to 14.0 per cent of phosphorus, 25 to 28 per cent of calcium, and less than 0.2 per cent of fluorine. This mineral should substitute safely for

steamed bone meal in feeding livestock.

"Under range conditions cattle consumed satisfactory amounts of Supplement B, containing 45 parts of defluorinated superphosphate, although they showed some preference for Supplement A, containing steamed bone meal.

"Beef cattle on improved pastures refused to take plain defluorinated superphosphate. They preferred mixtures with a large proportion of salt over those containing less salt.

"Dairy heifers on improved pastures in central Florida chose a 7:3 mixture of salt and defluorinated superphosphate over four others with progressively lesser proportions of salt, while having free access to common salt and No. 1 'salt-sick' mineral.

"Dairy cows on improved pastures adjacent to brackish water expressed a decided preference for a 3:7 mixture of salt and defluorinated superphosphate and for the No. 2 'salt-sick' mineral, over four other mixtures containing progressively more salt. They had access to steamed bone meal, common salt and No. 1 'salt-sick' mineral at the same time.

"Pigs grazing peanuts ate slightly more of swine mineral containing bone meal than another group of pigs consumed of swine mineral with defluorinated superphosphate. They made slightly better gains also, but the differences were insufficient to be significant, based on one trial. Sows and boars found the experimental swine mineral to be palatable.

"Defluorinated superphosphate can be used satisfactorily with swine, beef and dairy cattle when offered in appropriate form. Its selection should be governed by convenience and economic reasons."

---

Land control, according to John F. Timmons of the Bureau of Agricultural Economics, has been the fatherof revolutions. He says in *Land Policy Review:* "Contrary to Marxian teaching, the world's revolutions have been bred and born in rural peasant countries, not in highly industrialized nations. The first revolution in Russia, the Mexican revolution, and the struggle of the Irish peasants are a few examples that substantiate this viewpoint."

## Trade Items

*AAA Phosphates*—Concern over the ability of producers of superphosphate to meet fertilizer requirements is reflected in bids on an offer by the Government for 1,500,000 tons of superphosphate to be distributed to farmers under the provisions of the Agricultural Adjustment Administration. Only 16 bids offering around 190,000 tons were received.

*No Imported Cottonseed Meal for Fertilizers*—Cottonseed meal imported recently was permitted to go to the feed trade and none to fertilizer manufacturers, it is reported.

*Nitrate of Soda*—For the year ending June 30, 1945, federal agencies have allocated shipping space for 850,000 tons of Chilean nitrate.

*Sulphur*—Bureau of Mines places production of sulphur in September, 1944, at 35 per cent greater than for September, 1943, with sales showing an increase of 15 per cent. Production is still behind 1942. Stocks at the end of September were 4,140,976 against 4,657,486 at the same period last year.

*Synthetic Ammonia*—Ordnance continues to absorb much of the nitrogen solutions. The available supply is far short of agricultural requirements.

*Linseed and Soy Meals*—The War Food Administration is reported to have purchased 800,000 pounds of linseed meal and 1,000,000 pounds of soybean meal during October for lend-lease.

*Bone Meal*—The War Food Administration has purchased 3,540,000 pounds of bone meal up to November this year, of which 540,000 pounds were purchased in October.

---

The labor shortage retarding the processing of peanuts has been relieved to a considerable extent by the use of German war prison labor. Sorting and selecting peanuts entails much hand labor.

---

"Agriculture probably is in the best position it has ever been in to withstand post-war shocks. There are going to be big changes in acreage to many commodities after the war, among them wheat and cotton."—I. W. Duncan, Governor, Farm Credit Administration.

## Georgia Makes Crop Records

Summarizing 1944 uprotdocin, Extension Director Walter S. Brown, of Georgia, reports an increase in peanut production of 9,000 tons over 1943; the highest per-acre yield of cotton on the smallest total acreage since 1917; an increase in tobacco production of 25,000,000 pounds over 1943 and second largest in history; the largest oat crop in the history of the State; the largest wheat crop since 1900; largest per-acre yields of both wheat and oats in history; but a reduction in yields of corn and hay due to weather.

## European Shift from Livestock to Food Crops

A definite shift from livestock to food crops in Europe, in an effort to meet food requirements, is reported. Estimated in terms of calories, food production in Europe has been remarkably well maintained, considering the shortage of fertilizers, equipment, labor and other essentials of production.

## Farm Population Slump

Federal estimates show that since January, 1940, the farm population of the United States has slumped 4,478,000. Of this number 1,650,000 have gone into the armed service, while 3,098,000 have shifted from farm to urban employment or residence with members of the family employed in cities.

A total of 1,547,465 tons of fertilizer were used on cotton in 1944, an average of 328 pounds per acre. In 1943 about 26,000 tons were used. In southeastern States about 90 per cent of all acreage in cotton was fertilized.

## November Sulphate of Ammonia

The figures of the U. S. Bureau of Mines show little change in the sulphate of ammonia situation. Production during November dropped 3.4 per cent from October, due to the slightly shorter work month. Sales increased somewhat, with the result that stocks on hand dropped from 77,000 tons on October 31st to 71,000 tons on November 30th.

For the first eleven months of 1944, production was 50,000 tons ahead of the same period of 1943.

| | Sulphate of Ammonia Tons | Ammonia Liquor Tons $NH_3$ |
|---|---|---|
| Production | | |
| November, 1944 | 67,143 | 2,523 |
| October, 1944 | 69,474 | 2,716 |
| November, 1943 | 60,818 | 2,746 |
| January-November, 1944 | 745,716 | 29,098 |
| January-November, 1943 | 695,235 | 31,203 |
| Sales | | |
| November, 1944 | 72,926 | 2,379 |
| October, 1944 | 71,443 | 2,532 |
| November, 1943 | 72,528 | 2,912 |
| Stocks on Hand | | |
| November 30, 1944 | 71,260 | 676 |
| October 31, 1944 | 77,046 | 678 |
| November 30, 1943 | 33,705 | 939 |
| October 31, 1943 | 44,957 | 983 |

"I can see the vast possibilities for mutual progress and mutual benefit, if today's businessmen will regard the farmer as a fellow businessman and the farmer himself will have the same conception of his position. It will do more to straighten out the individual thinking of each than anything I can possibly conceive."—Graham Patterson, President, *The Farm Journal.*

More than 11,000 of the nation's practical farmers are now serving on agricultural advisory committees to advise returning war veterans interested in farming.

See Page 4

## KNOW YOUR SOIL

(Continued from page 10)

available about the same amount of nitrogen as the sandy soil.

The safest way to have adequate nitrogen in the soil available to the plant is through a good organic matter content and supplemented by plant debris, manure and commercial fertilizers. An analyses of the soil for the organic matter content and a knowledge of the plant material returned to the soil give the grower a working basis for nitrogen fertilization. See Bulletins 1 and 3 Campbell Soup Co. Research Department.

### Phosphorus

The phosphorus requirement of the plant is about one third as much as nitrogen in actual weight, but there are more phosphate-deficient soils than there are nitrogen-deficient ones and still there is more phosphorus applied as commercial fertilizers. This is due to the fixation power of the soil. In other words, it is difficult to keep phosphorus available to the plants even though it is not reached from the soil. This fixation varies tremendously from soil to soil. Strongly acid soils fix in an unavailable state more phosphorus than properly limed soils; soils well supplied with organic matter fix less than soils poorly supplied and red and yellow soils more than gray and brown soils. A thousand pounds of 5–10–10 fertilizer will supply three times as much phosphorus as is needed for a 10-ton crop of tomatoes. However, many soils will require more phosphorus than that to produce 10 tons. To safeguard a crop from phosphorus deficiency, lime to about 80 per cent of the lime-holding capacity (pH 6.2 to 6.5), supply organic matter in abundant amounts and use selected methods of applying the phosphorus, but above all find out if your soil is the type that has a high phosphate requirement. See Fig. 6.

### Potash

By far the largest amount of any of the plant foods needed by the plant is potash. Whereas 100 pounds of nitrogen and 35 pounds of phosphoric acid are used by 3,000 tomato plants, 200 pounds of potash are required for a 10-ton crop of tomatoes. While little over one-half of this is taken off of the soil by the fruit, the total amount is required to produce the crop. Since most satisfactory crops produce from 15 to 20 tons of tomatoes (harvested 10 to 15 tons), it is readily seen that the use of adequate potash is necessary. Most of the soils in the eastern part of the United States are deficient in potash, therefore, it is necessary to supply a large part of it in commercial fertilizers. However, here again soil

No phosphorus

160 pounds phosphoric acid

Fig. 6. Field tests, an essential method of finding the fertilizer requirements of the soil

improving crops in the crop rotation are important.

A knowledge of the amount of readily available potash in the soil can be learned from a quick analysis of the soil. A crop producing program to maintain in an available state an adequate supply of potash can be established if one knows his soil conditions.

(Continued on page 28)

### Summary and Conclusion

There is available a wealth of practical and scientific information about soils, but for a grower to succeed he must know his own soil. He must study this soil, find out when to plow it and how to plow it to get it into the best physical condition for the crop to be grown. He must learn the status of lime in the soil and know how much is needed to put the soil in an ideal condition for crop growth as well as how to apply it and when. He must know how much organic matter he has in his soil and whether his crop rotation is building or tearing down his supply. He must know how much nitrogen, phosphorus, and potash are required and how to apply them. The grower must get this information through a system of analyses of his soils, or through the hard way, by trial and error. Last, but not least, the grower must be open-minded and receptive to new ideas. He must study scientific information advanced and think about his conditions and see if he can apply the information to his farm and farming practices. In other words, he is the master of his own ship and where he steers it, it will land.

---

### GREENHOUSE TESTS ON ROCK PHOSPHATES

(Continued from page 12)

yields. While the Curacao and Christmas Island phosphates, respectively, had a low fluorine content and produced relatively high yields of millet, an even higher yield was obtained with the South Carolina land-rock phosphate that contained 3.54 per cent of fluorine.

In Table II a comparison of amount of available $P_2O_5$ applied with the yields obtained (columns 2 and 3) indicates that there is some correlation in the case of the first six or seven high-yielding phosphates, for up to a certain point the more available $P_2O_5$ applied, the greater the yield of millet. The addition of greater quantities of the raw phosphates might have resulted in larger yields of millet. For example, if the rate of application of the South Carolina land-rock phosphate had been doubled, thereby doubling the amount of available $P_2O_5$, the yield might have been stepped up some. However, to do so with any of the low-availability raw phosphates would be rather uneconomical, due to the quantity of material necessary to furnish a quantity of available $P_2O_5$ equivalent to that furnished by superphosphate.

Two additional pot-culture tests were made in the greenhouse to compare (1) South Carolina land-rock phosphate, Tennessee brown-rock phosphate, and waste-pond phosphate with superphosphate as sources of phosphorus for German millet when grown on different soils—Caribou loam, Chester loam, Norfolk loamy fine sand, and Sassafras fine sandy loam—and (2) these same phosphates when used as sources of phosphorus for German, Hungarian, and Japanese millet grown on Norfolk loamy fine sand. The results of these two series are presented in Tables III and IV, respectively.

The results given in Table III follow a trend similar to practically all comparisons of raw phosphates and superphosphate, in showing that the latter generally outstripped the less available phosphates in promoting crop growth in pot-culture studies. The results show also that, of the several phosphate rock samples compared, the South Carolina land-rock phosphate produced the highest yields of German millet on all soils.

The results of the second pot-culture study (Table IV) indicate that superphosphate was superior to any of the raw-rock phosphates; that South Carolina land-rock and Tennessee brown-rock phosphates were about equally efficient; and that waste-pond phosphate had the lowest plant-nutrient efficiency rating of any phosphate treatment.

#### Summary

Greenhouse pot-culture results are given, showing the relative effectiveness of 16 raw-rock phosphates as sources of phosphorus for Japanese millet. Four samples were of foreign origin and 12 were derived from domestic sources. All phosphate rock samples were ground to pass a 100-mesh sieve. The standard of comparison was superphosphate containing 19.2 per cent available $P_2O_5$.

Some variation was evident in the relative effectiveness of the various phosphates, in that South Carolina land-rock phosphate, Curacao Island phosphate, Christmas Island phosphate, and Morocco phosphate made the best showings in comparison with superphosphate.

# THE DOUGH YOU BLOW —will bring U.S. woe!


**What a boom** we were handed by World War No. 1! Money came easily—went easily. Everybody was splurging on everything. Prices went skying. Sugar eventually hit 28¢ a pound!


**Bye-bye, boom.** Factories closed; men laid off. Prices and wages sinking fast. With jobs scarce, some of that dough we'd blown would have come in mighty handy then.


**Prosperity.** Stocks up fifty points in a week. Again everybody was buying everything—regardless of cost. Depression? Phooey . . . We thought we'd found a way to *lick* depressions.


**Or had we?** Bread lines, apple venders. WPA. Prices dropping. Wages dropping. Everything dropping—except the mortgage. "What goes up must come down." Depression follows a rise.


**We're splurging again.** Americans have been earning more. But even today there are fewer goods to spend it on—so naturally prices rise. DON'T LET *IT* ALL HAPPEN AGAIN!

---

## 4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than the ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more—for your labor, your services, or the goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.


A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

However, no raw-rock phosphate equalled the performance of the more available superphosphate.

Placing the no-phosphorus control at 100, the relative standing was 250 for superphosphate, 196 for South Carolina land-rock, 151 for Curacao Island phosphate, 142 for Christmas Island phosphate, and 140 for Morocco phosphate, whereas the others ranged from 114 (Nauru Island phosphate) downward to 104 for the lowest (Tennessee blue-rock phosphate).

In view of the relatively high effectiveness of the South Carolina land-rock phosphate, another pot-culture test was made on four different soils to determine the behavior of this particular phosphate (toward German millet) in comparison with superphosphate and three other domestic rock phosphates. The results showed that the South Carolina phosphate proved less effective than superphosphate in all comparisons but exceeded the other raw-rock phosphates in growth-promoting efficiency. The waste-pond phosphate had the lowest rating.

In a final pot-culture test employing German, Hungarian, and Japanese millet as indicator plants, the superphosphate treatment was superior, the South Carolina and Tennessee phosphates were about equal, and the waste-pond phosphate was lowest in nutrient efficiency.

TABLE III

RESULTS WITH GERMAN MILLET COMPARING SUPERPHOSPHATE AND FOUR DOMESTIC PHOSPHATE ROCK SAMPLES WHEN APPLIED TO FOUR TYPES OF SOIL

Weight of Millet (30 Plants, Oven-dry Basis) Grown on Different Soils[1]

| Source of $P_2O_5$ in 5–12–6 Mixture | Caribou Loam, pH 4.6 | | Chester Loam, pH 6.5 | | Norfolk Loamy Fine Sand, pH 5.5 | | Sassafras Fine Sandy Loam, pH 5.6 | |
|---|---|---|---|---|---|---|---|---|
| | Actual Grams | Relative Per cent | Actual Grams | Relative Per cent | Actual Grams | Relative Per cent | Actual Grams | Relative Per cent |
| N-K (5–0–6) | 54.8 | 100.0 | 32.0 | 100.0 | 31.3 | 100.0 | 54.7 | 100.0 |
| Superphosphate | 72.6 | 132.0 | 50.2 | 157.0 | 55.4 | 177.0 | 63.5 | 116.0 |
| Waste-pond phosphate | 60.8 | 111.0 | 40.5 | 127.0 | 31.0 | 99.0 | 56.0 | 102.4 |
| Florida land-pebble, Mulberry | 60.8 | 111.0 | 42.6 | 133.0 | 38.0 | 121.4 | 55.4 | 101.3 |
| South Carolina land-rock | 64.0 | 117.0 | 46.6 | 145.6 | 44.0 | 140.6 | 58.5 | 106.9 |
| Tennessee brown-rock, Mt. Pleasant | 60.6 | 110.6 | 41.4 | 129.0 | 30.8 | 98.4 | 56.2 | 102.7 |

[1]Three replications, 10 plants each.

TABLE IV

RESULTS WITH THREE MILLETS (GERMAN, HUNGARIAN, AND JAPANESE) COMPARING SUPERPHOSPHATE AND FOUR DOMESTIC PHOSPHATE ROCK SAMPLES

Soil type: Norfolk loamy fine sand, pH 5.5

Yield of Millet (30 Plants, Oven-dry Basis)[1]

| Source of $P_2O_5$ in 5–12–6 Mixture | German | | | | Hungarian | | | | Japanese | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Actual Weight | | | Relative[1] | Actual Weight | | | Relative[1] | Actual Weight | | | Relative[2] |
| | Stalks Gms. | Heads Gms. | Total Gms. | | Stalks Gms. | Heads Gms. | Total Gms. | | Stalks Gms. | Heads Gms. | Total Gms. | |
| N-K (5–0–6) | 40.3 | 2.3 | 42.6 | 100.0 | 45.5 | 7.2 | 52.6 | 100.0 | 71.3 | 28.1 | 99.4 | 100.0 |
| Superphosphate | 81.4 | 8.7 | 90.1 | 211.5 | 52.4 | 11.9 | 64.3 | 122.2 | 109.1 | 39.6 | 149.6 | 149.6 |
| South Carolina land-rock | 61.0 | 6.8 | 67.8 | 159.1 | 46.5 | 9.0 | 55.5 | 105.5 | 91.0 | 36.5 | 127.5 | 128.2 |
| Waste-pond phosphate | 49.2 | 4.2 | 53.4 | 125.3 | 45.5 | 8.2 | 53.7 | 102.1 | 74.3 | 30.4 | 114.7 | 115.4 |
| Tennessee brown-rock | 61.6 | 5.8 | 67.4 | 158.2 | 47.2 | 9.6 | 56.8 | 108.0 | 91.3 | 36.7 | 128.0 | 128.7 |

[1]Three replications, 10 plants each. [2]Relative comparisons based on total weights.

# BUYERS' GUIDE • A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

**This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.**
**For Alphabetical List of Advertisers, see page 33.**

A Classified Index to Advertisers in "The American Fertilizer"

# BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

# BUYERS' GUIDE

**SCREENS**
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.
Utility Works, The, East Point, Ga.

**SEPARATORS—Air**
Sackett & Sons Co., The A. J., Baltimore, Md.

**SPRAYS—Acid Chambers**
Monarch Mfg. Works, Inc., Philadelphia, Pa.

**SULPHATE OF AMMONIA**
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
McIver & Son, Alex. M., Charleston, S. C.
Nitrogen Products, Inc., New York City
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

**SULPHUR**
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City.

**SULPHURIC ACID**
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

**SUPERPHOSPHATE**
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

**SUPERPHOSPHATE—Concentrated**
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

**TANKAGE**
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

**UREA**
DuPont de Nemours & Co., E. I., Wilmington, Del.

**UREA-AMMONIA LIQUOR**
DuPont de Nemours & Co., E. I., Wilmington, Del.

**VALVES**
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Utility Works, The, East Point, Ga.

**ZINC SULPHATE**
Tennessee Corporation, Atlanta, Ga.

## Alphabetical List of Advertisers

P.C.A.
RED MURIATE

# *The* SALT *of the Earth*

There can be no finer product than PCA's Red Muriate of Potash. Literally as well as figuratively it is "The Salt of the Earth".

PCA leads in total production of 60% Muriate. Its Red Indian trade-mark is becoming more and more important in the fertilizer industry...more and more important to the farmers who rely upon your mixtures to help them make their crops.

P.C.A.
RED MURIATE

## *POTASH COMPANY of AMERICA*

CARLSBAD, NEW MEXICO

ARMY E NAVY

GENERAL SALES OFFICE 50 Broadway, New York, N. Y. • SOUTHERN SALES OFFICE...Mortgage Guarantee Building, Atlanta, Ga.

# No More Priorities

## ON ST. REGIS VALVE-BAG PACKING MACHINES

*They offer maximum industrial packing efficiency and economy*


Here's great news to start off 1945!

The government has consistently recognized the efficiency and economy of the St. Regis Valve-bag Packing System. And now, all priority controls have been removed from St. Regis bag-filling equipment.

These machines, plus St. Regis Valve Bags comprise a packaging system which reduces packaging costs while providing greater product protection. Here's why:

The St. Regis Valve Bag is made of tough kraft paper . . . 2 to 6 plies in thickness. It is securely factory-fastened at both top and bottom and has a specially designed filling valve in one corner. When the bag is filled, the internal pressure of the contents automatically closes this valve. (See illustrations at right.)

In addition, St. Regis Valve-packing Machines accurately pre-weigh the product and pack it into the bags. This modern packaging system is saving time and the cost of extra labor and equipment for many manufacturers.

Our Machine and Engineering Division is ready to extend the use of the St. Regis Valve-pack System in the fields of construction materials, chemicals, agriculture, and food products. Write for full information today.

FACTORY-CLOSED AT TOP AND BOTTOM

1. *Before Filling:* Showing the corner valve of a Multiwall bag in the open position ready for machine filling.

2. *After Filling:* The internal pressure of the contents has automatically closed the valve and the filled bag is all ready for shipping.

MULTIWALL PAPER BAGS

MULTIPLY PROTECTION • MULTIPLY SALEABILITY

**ST. REGIS PAPER COMPANY**

TAGGART CORPORATION

NEW YORK 17: 230 Park Ave. CHICAGO 1: 230 No. Michigan Ave.
BALTIMORE 2: 2601 O'Sullivan Bldg. SAN FRANCISCO 4: 1 Montgomery St.

IN CANADA:
BATES VALVE BAG CO., LTD.
Montreal, Quebec
Vancouver, British Columbia

Boston, Mass. Birmingham, Ala. Dallas, Tex. Denver, Colo.
No. Kansas City, Mo. Los Angeles, Calif. New Orleans, La.
Franklin, Va. Seattle, Wash. Nazareth, Pa. Toledo, Ohio